Foreword

National Oceanic and Atmospheric Administration

U.S. DEPARTMENT OF COMMERCE

NOAA Fisheries Service
Northeast Cooperative Research Partners Program

The National Marine Fisheries Service (NOAA Fisheries Service), Northeast Cooperative Research Partners Program (NCRPP) was initiated in 1999. The goals of this program are to enhance the data upon which fishery management decisions are made as well as to improve communication and collaboration among commercial fishery participants, scientists and fishery managers. NOAA Fisheries Service works in close collaboration with the New England Fishery Management Council's Research Steering Committee to set research priorities to meet management information needs.

Fishery management is, by nature, a multiple year endeavor which requires a time series of fishery dependent and independent information. Additionally, there are needs for immediate short-term biological, oceanographic, social, economic and habitat information to help resolve fishery management issues. Thus, the program established two avenues to pursue cooperative research through longer and short-term projects. First, short-term research projects are funded annually through competitive contracts. Second, three longer-term collaborative research projects were developed. These projects include: 1) a pilot study fleet (fishery dependent data); 2) a pilot industry based survey (fishery independent data); and 3) groundfish tagging (stock structure, movements and mixing, and biological data).

> First, a number of short-term research projects have been developed to work primarily on commercial fishing gear modifications, improve selectivity of catch on directed species, reduce bycatch, and study habitat reactions to mobile and fixed fishing gear.
>
> Second, two cooperative research fleets have been established to collect detailed fishery dependent and independent information from commercial fishing vessels. The original concept, developed by the Canadians, referred to these as "sentinel fleets". In the New England groundfish setting it is more appropriate to consider two industry research fleets. A pilot industry-based survey fleet (fishery independent) and a pilot commercial study fleet (fishery dependent) have been developed.
>
> Additionally, extensive tagging programs are being conducted on a number of groundfish species to collect information on migrations and movements of fish, identify localized or subregional stocks, and collect biological and demographic information on these species.

For further information on the Cooperative Research Partners Programs please contact:

National Marine Fisheries Service (NOAA Fisheries Service)
Northeast Cooperative Research Partners Program

(978) 281-9276 – Northeast Regional Office of Cooperative Research
(401) 782-3323 – Northeast Fisheries Science Center, Cooperative Research Office, Narragansett Laboratory

www.nero.noaa.gov/StateFedOff/coopresearch/

A Collaborative Program to Assess Possible Temporal Access To Closed Area II: Targeting Yellowtail Flounder Without Significant Bycatch of Cod and Haddock

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Northeast Regional Office, NMFS
Northeast Cooperative Research Programs Initiative
One Blackburn Drive
Gloucester, MA 01930-2298

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Submitted by:

The Groundfish Group
Associated Fisheries of Maine
PO Box 287
S. Berwick, ME 03908

And

Manomet Center for Conservation Sciences
PO Box 1770
Manomet, MA 02345

Date:
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Final Report

A Collaborative Program to Assess Possible Temporal Access To Closed Area II: Targeting Yellowtail Flounder Without Significant Bycatch of Cod and Haddock

By

Christopher Glass, Maggie Raymond, Benedetta Sarno, Tim Feehan, Gregg Morris

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Introduction

Seasonal and year-round closures of fishing grounds have been useful tools for the Northeast Multispecies Fishery Management Plan (FMP) of the New England Fishery Management Council (NEFMC). These closures have proven effective in improving the status of several species covered under the FMP, and in particular, the status of Georges Bank (GB) yellowtail flounder.

The status of GB yellowtail flounder has improved markedly since the implementation of Closed Area II in 1994. The spawning stock has increased from 2600 mt in 1992 to 33,500 mt in 1999 (SAW, 2000). Mean biomass has also increased from 4,500 mt to 49,600 mt in the same time period (SAW, 2000). In 2001 the TRAC Advisory Report on Stock Status estimates the SSB to be between 37,000 and 50,500 mt (80% probability) and the mean biomass to be between 48,000 and 66,500 mt (80% probability). This brings the GB yellowtail flounder biomass well above the rebuilding target of 49,000 mt (TRAC, 2001). Despite this, concerns about cod and haddock prevent utilization of the rebuilt stock of GB yellowtail flounder. However, common knowledge within both the fishing and scientific communities suggests that cod and haddock are less available in certain portions of Closed Area II during specific seasons.

The fishing grounds within Closed Area II have significant historical economic importance to multispecies fishermen. While multispecies fishermen continue to support the use of closed areas as a tool to rebuild depleted stocks, they also hope to regain access to closed areas once the desired rebuilding results have been achieved (Raymond, pers. comm.).

The project reported here mirrors, in many ways, the program that ultimately resulted in seasonal access to Closed Area II by scallop fishermen. First, scallop fishermen demonstrated through an observer-based program, conducted by the University of Massachusetts School of Marine Science and Technology (SMAST), in August through October, 1998, that scallop fishing could take place in parts of Closed Area II with minimal bycatch of GB yellowtail flounder.

Access to Closed Area II by scallop vessels was subsequently allowed in the portion of Closed Area II south of 41°30' based on the analysis of distribution of cod, haddock and yellowtail flounder catches in the SMAST demonstration project, which proved to be low for all species. Access was further constrained to the months of June through December to "avoid disrupting spawning aggregations of overfished groundfish stocks that spawn primarily during the spring and early summer months" (NEFMC, 1999a; NEFMC, 1999b).

Using the information made available from the SMAST project regarding the distribution of cod, haddock and yellowtail flounder and embracing the objective of avoiding spawning aggregations, this project proposed seasonal access to the area south of 41°30' within Closed Area II during the months of July through December. Additionally, the principal investigators chose to cap the directed harvest of GB yellowtail flounder during the experiment to a level below that which was allowed as bycatch in the scallop fishery (387 mt).

Here we report on the cooperative research program that was designed to determine if rebuilt yellowtail flounder in the southern portion of Closed Area II (CAII) could be harvested without a significant bycatch of cod and haddock. This program represented a true collaborative venture between the fishing industry, NOAA/NMFS and scientists through an observer based survey program which documented the quantity and composition of catch and discards on a seasonal basis.

The information gathered through this survey has significant implications as to the potential benefits and pitfalls of utilizing closed areas as a management tool.

Project Development

The project described here involved a great many individuals and represented a great many interests. As such, the program required detailed preliminary planning and coordination. A series of meetings and conference calls between Associated Fisheries of Maine and Manomet Center for Conservation Sciences provided the initial outline for the program. Subsequently, meetings and conference calls were held with representatives of the NOAA/NMFS Northeast Regional Office, The Northeast Science Center, NOAA/NMFS Cooperative Research Partners Initiative, Northeast Regional Office Permitting staff, the United States Coastguard, The Atlantic Offshore Lobstermen's Association (AOLA) and other scientists and fishermen. These meetings ensured that the program was constructed in a manner that maximized potential usefulness of the data.

In addition to ensuring data reflected the needs of managers, regulators and assessment scientists, the most significant outcome of the preliminary development meetings was the degree of cooperation fostered within the industry and with other agencies. Building on the example set by the previously mentioned SMAST project, we sought to include the Atlantic Offshore Lobstermen's Association in the development of the project in an attempt to avoid potential gear conflicts within the experimental area. Prior to the start of each trip, the AOLA, the US Coastguard, the NERO and the NEFSC were informed of the date and time of departure. This exchange of information served a number of purposes. First, from a safety point of view it alerted the Coastguard to the fact that two fishing vessels would be fishing offshore in an area with few if any other fishing vessels. Second it alerted any fixed gear fishermen that a survey was underway. Agreement was reached so that any fixed gear that might compromise sampling in any sampling box would be removed for the duration of the sampling tow and replaced subsequently.

The initial intent was to conduct sampling trips each month from July through December of one calendar year. However the protracted process of obtaining the requisite experimental fishing permits resulted in a two month delay at the start of the program. This in turn resulted in a 6 month gap in the middle of the program and an overall extension of the time-frame of the project by some 9 months. Sampling was conducted from September 2002 through December 2002 and again from July 2003 through September 2003.

Despite the fact that the planning process was extremely lengthy and involved many individuals and agencies, the information exchange and interactions undoubtedly resulted in a robust set of protocols designed to maximize usefulness of data.

Methodology

Experimental fishing was conducted in the southern portion of Closed Area II as illustrated in Figure 1. The experimental area, equivalent to approximately 1504 square miles, was divided into a sampling grid (Figure 1 and Figure 2) each grid approximating to 6nm x 6nm. In total the area was divided into 39 separate sampling areas as shown in Figure 2. Sampling was conducted from September 2002 through December 2002 and again from July 2003 through September 2003. A list of volunteer vessels from the Associated Fisheries of Maine Groundfish Group was compiled and participating vessels were selected by lottery. Twelve vessels and a number of alternates were selected (see Appendix 1 for vessel names and home ports). Vessels were exempted from days-at-sea regulations and were permitted to sell fish caught during the survey. Proceeds from the sale of these fish were used to help fund the program, effectively reducing the overall cost of the project and potentially making the funding available for other research projects. Sale of fish realized enough monies to conduct an additional set of sampling trips in September 2003 thereby increasing the sample size and data set and allowing comparison of fish distributions between years albeit for only on month (September 2002 and September 2003).

The project involved two vessels conducting one concurrent trip per month with each vessel completing all assigned sampling areas each trip. Appendix 2 details the sampling stations and protocols employed on each trip. These data sheets were handed to each participating Captain prior to the start of a sampling trip and retained in the wheelhouse throughout the trip. On each trip the vessels were arbitrarily assigned a vessel number at the start of the trip e.g. vessel 1 or vessel 2, and each vessel was assigned a series of sample squares as outlined in Appendix 2. Each trip comprised a maximum of 5 days (2 days steaming and 3 days sampling). Sampling was terminated after three days whether all stations were sampled or not. All stations were sampled on all but one trip. Hauls were standardized at 20 minutes (brakes locked to brakes released) and the starting point and direction of tow was left to the discretion of the fishing vessel Captains. The only proviso was that the vessel was required to remain within the specified sample square at all times during the tow. To ensure compatible data between vessels, nets and ground gear used for this project were standardized as far as was possible or practicable. 6 ½" square mesh codends were used throughout the study. Figure 3 illustrates the 6 ½" square mesh codend and a typical catch obtained from a 20 minute tow. Sampling in any given box was conducted by one vessel (see Appendix 2) except in 6 different locations (sample squares 5, 10, 21, 26, 37 and 39) where side-by side tows were specified. This represented a ratio of one paired or comparison tow out of every 8 grids sampled. During side by side hauls vessels were asked to fish as close to each other as possible (Figure 4) (within a safe distance at the Captains discretion) and hauls were required to be synchronized, that is, shooting and hauling at exactly the same time. In practice this required one or other of the vessels to wait for the other vessel to arrive at the specified location. This sampling protocol provided 6 areas for comparison hauls for each trip as well as a uniform distribution of sampling areas for each vessel. Vessel 1 was required to conduct a total of 26 hauls while vessel 2, a total of 25 hauls for a grand total of 51 hauls conducted in the study area for each trip. Trips were limited to 2000 lbs. of cod per day, 3000 lbs. of haddock per day and 40,000 lbs. of yellowtail flounder per day. In addition, a total TAC for GB yellowtail flounder was set at 220 mt for the 6-month project. It is important to mention that the TAC of 220 mt was not a goal for the project, but intended to constrain the total catch to something close to the TAC that was allowed for the experimental scallop fishery. This TAC was little more than half the bycatch TAC allowed to the scallop fishery when they re-accessed Closed Area II. To accomplish the goal of disseminating data in a real time format, all vessels participating in this project were outfitted with the vessel monitoring system (VMS). Hauls were conducted during daylight hours.

Each vessel permitted to participate in the project carried two observers from Manomet Center for Conservation Sciences. Sampling of the catch was conducted on a tow by tow basis using full NMFS sea-sampling protocols. Crewmembers were assigned to assist with sorting the catch by species and to assist samplers as appropriate. All species were weighed, and length frequencies were taken from all commercially important species. Figure 5 shows Manomet sea-samplers displaying samples of the catch. All undersized fish were returned to the sea immediately after processing scientific information.

Interim reports were provided to NMFS, NERO, CRPI at the end of each trip, outlining trip catch, bycatch and discard levels and running totals of the project as a whole. In addition, all data were recorded on NMFS Sea-Sampling data sheets and data were made available on completion of the program to NMFS in the form of original data sheets and in electronic format.

Results

Overall catch rates for each species and each sampling month are shown in Table 1. The data are presented as total weight (lbs.) and as percentage of the total catch both by month and overall. Tables 2-8 show the data split for each vessel and for each month of the study. Figure 6 shows the total percentages of each species caught (by weight) for the project aggregate data. Yellowtail flounder comprised 21% of the total catch by weight while cod comprised a fraction of 1% (0.09%, Table 1). Examination of Tables 1 through 8 show that in some months (September and October 2002) zero cod were caught while in other months never comprised greater than 0.35% of total monthly catch. It should be noted however that total weights are skewed slightly by the recorded weight of scallops which represent uncut weights rather than the more usual weight of meats. All scallops and lobsters were returned to the sea immediately after sampling.

The aggregate length frequency distribution of yellowtail flounder is show in Figure 7. In total nearly 39,000 individual yellowtail flounder were measured during the course of this study. The mean length of yellowtail flounder caught was 41 cm with a mode of 42 cm and an upper length of 56 cm. This upper length represents the maximum length attained by yellowtail in the wild. It should also be noted that less than 2% of yellowtail brought on deck fell below the current minimum landing size (33 cm). Figure 8 shows the length frequencies of yellowtail by month while Figure 9 shows these data in standardized form. Examination of these data and smoothed curves generated from the data (Figures 10 and 11 respectively) show very little difference in length frequency distributions from month to month. Furthermore, if the data are split by vessel and by month as shown in Figures 12 and 13, the mean length and range of fish captured remains remarkably stable. Few other species were caught in sufficient numbers to merit similar treatment, however length frequency distributions by month and by vessel are presented for winter flounder (Figure 14), monkfish (Figure 15) and barndoor skate (Figure 16). Some species were caught in large numbers (e.g. little skate and winter skate) but were not deemed to be of commercial importance and were not measured individually. Barndoor skate were caught commonly in relatively low numbers but were deemed to be of scientific interest and therefore measured individually.

Fish Distribution

For each month the distribution of fish of any given species was plotted for each sample gird. Where side by side tows were undertaken density was determined by taking the sum of the two catches and dividing by two. Initially these distribution plots were plotted using the standard format employed in the NMFS Resource Survey Report where the weight of fish caught for a given species is represented by a circle whose diameter is proportional to the weight of catch. In this case data are assigned to one of three weight-class categories; 1-10 lbs., 11-50 lbs. and >50 lbs. Figure 17 shows the distribution of yellowtail flounder throughout the entire experimental area for September 2002. Each data point is centered within its grid and does not necessarily correspond to absolute position at the start of the tow. Figures 18 and 19 show corresponding data for haddock and cod respectively. Yellowtail can be seen to be distributed through the sample area while haddock was found in much smaller quantities in only 2 out of 39 sample locations. No cod were caught anywhere during September 2002 (Figure 19). Similar distribution maps were produced for all commercially important species for each month (see Appendix 3).

Presenting catch data in three weight-class bins (as outlined above; Appendix 3) is informative as a first step but tends to underestimate higher densities while overestimating low catches in other areas. In order to better visualize fish density distributions, the data were subject to statistical Krieging techniques that generate density distribution contours which better represent actual catch in each of the sample boxes. Figures 20 and 21 show the resultant density distribution contours from data presented in Figures 17 (yellowtail) and 18 (haddock) respectively. Data are binned into 400m x 400m pixels. Density distribution contour plots for all commercially important species and each month are presented in Appendix 4. Different color coding is used for some species to differentiate between different scales due to vastly different catch rates. Yellowtail flounder was always the dominant species with catches up 1,400 lbs. for 20 minutes towing time.

Figures 22 through 29 summarize density distributions for each species throughout the study period. Figure 30 shows density data for all skate species combined. It is clear that fish distributions are dynamic over the course of the study but it is also interesting to note that although many species can be found in every sample square, there are clear concentrations for individual species and that these areas of peak density tend to show little overlap between species. Figures 31 through 37 show monthly distribution patterns for the eight key species in composite form. These plots show that peak densities of different species show a degree of overlap but they also hint at some form of niche separation.

Net mounted temperature sensors were attached to the trawl nets during most sampling trips. However, recorder malfunction during some trips resulted in an incomplete database. Seabed water temperatures recorded during 4 sampling months are illustrated in Figure 38. This truncated dataset shows that seabed water temperature not only varies considerably over the course of a year but can also vary considerably from station to station within one sampling trip. For example, data for October 2002 (Figure 38) shows water temperatures of 6-8 ^{o}C in the southeast portion of the sample area while temperatures as high as 16-18 ^{o}C can be found less than 18 nm to the west. This dramatic temperature gradient represents the most extreme gradient recorded but even in months where temperatures were more homogeneous there can still be substantial differences between the top of the bank and deeper water to the east. Such differences in water temperature could be a significant factor driving differential fish distributions and could obviously vary from year to year. However, in the absence of long term data sets we are not able to infer any significant relationship between seabed temperature and differential fish distributions at this time. This is clearly an area that would benefit from further research.

Results of this study were made available at the completion of each trip, to NOAA/NMFS, The Northeast Regional Office, The NOAA/NMFS Cooperative Research Partners Initiative and to industry members. This open dissemination of raw data allowed individuals and institutions to analyze and assimilate the data into real time management initiatives and the data were scrutinized during development of Amendment 13 to the multispecies fisheries management plan. NOAA/NMFS and the New England Fisheries Management Council examined the raw data and a draft outline of this assessment is included in Appendix 5.

TOTALS

SPECIES	TOTAL LBS	TOTAL %	SEPT LBS	SEPT %	OCT LBS	OCT %	NOV LBS	NOV %	DEC LBS	DEC %	JULY LBS	JULY %	AUG LBS	AUG %	SEPT03 LBS	SEPT03 %
BUTTERFISH	5.9	0.00%	3.9	0.01%	0	0.00%	1.55	0.00%	0.25	0.00%	0	0.00%	0	0.00%	0.2	0.00%
CLAM, SURF	1	0.00%	1	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
COD, ATLANTIC	**232.5**	**0.09%**	**0**	**0.00%**	**0**	**0.00%**	**39.5**	**0.10%**	**151**	**0.35%**	**19.5**	**0.07%**	**4.5**	**0.01%**	**18**	**0.04%**
CRAB, CANCER	2.5	0.00%	1.5	0.00%	0	0.00%	0	0.00%	1	0.00%	0	0.00%	0	0.00%	0	0.00%
CRAB, JONAH	98.6	0.04%	2	0.00%	7.8	0.03%	11	0.03%	2.8	0.01%	75	0.26%	0	0.00%	0	0.00%
CRAB, NK	7.5	0.00%	3	0.01%	0.2	0.00%	0.3	0.00%	0	0.00%	4	0.01%	0	0.00%	0	0.00%
CRAB, ROCK	2	0.00%	2	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
CUNNER	4	0.00%	0	0.00%	0	0.00%	4	0.01%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
DOGFISH, SMOOTH	6	0.00%	0	0.00%	0	0.00%	6	0.01%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
DOGFISH, SPINY	104.5	0.04%	28	0.05%	0	0.00%	52.5	0.13%	21	0.05%	0	0.00%	0	0.00%	3	0.01%
FLOUNDER, AMERICAN PLAICE (DAB)	315.8	0.12%	20.3	0.04%	3	0.01%	22.2	0.05%	20.5	0.05%	109.3	0.38%	96.7	0.31%	43.8	0.09%
FLOUNDER, FOURSPOT	251.55	0.09%	33.8	0.06%	10.95	0.05%	76	0.18%	52.8	0.12%	12.2	0.04%	21.1	0.07%	44.7	0.10%
FLOUNDER, SUMMER (FLUKE)	1079.8	0.40%	186.8	0.33%	38.5	0.16%	211	0.51%	212.5	0.50%	9.5	0.03%	81.5	0.26%	340	0.73%
FLOUNDER, WINDOWPANE (SAND DAB)	956.45	0.35%	60.3	0.11%	11.95	0.05%	487.8	1.19%	225.8	0.53%	9.7	0.03%	145	0.47%	15.9	0.03%
FLOUNDER, WINTER (BLACKBACK)	13483	4.99%	3459.5	6.16%	331	1.37%	2312	5.62%	2430	5.69%	1991	6.94%	1347.5	4.34%	1612	3.48%
FLOUNDER, WITCH (GREY SOLE)	425.1	0.16%	16.1	0.03%	6	0.02%	26.5	0.06%	12	0.03%	131	0.46%	162	0.52%	71.5	0.15%
FLOUNDER, YELLOWTAIL	**57775.05**	**21.37%**	**10340.5**	**18.41%**	**3077.25**	**12.71%**	**14238.7**	**34.64%**	**9988**	**23.40%**	**5136**	**17.89%**	**5982**	**19.26%**	**9012.6**	**19.45%**
HADDOCK	**2021.3**	**0.75%**	**25.1**	**0.04%**	**0**	**0.00%**	**237.5**	**0.58%**	**800**	**1.87%**	**403.8**	**1.41%**	**543**	**1.75%**	**11.9**	**0.03%**
HAKE, RED (LING)	44.55	0.02%	4.5	0.01%	1.2	0.00%	12.5	0.03%	21	0.05%	0.6	0.00%	1.25	0.00%	3.5	0.01%
HAKE, SILVER (WHITING)	53.35	0.02%	28.95	0.05%	3.1	0.01%	2.3	0.01%	0	0.00%	11.2	0.04%	3	0.01%	4.8	0.01%
HAKE, WHITE	118.05	0.04%	18.75	0.03%	1	0.00%	0	0.00%	29	0.07%	0	0.00%	69.3	0.22%	0	0.00%
LOBSTER, AMERICAN	4114.5	1.52%	1026.5	1.83%	1393	5.75%	375.5	0.91%	52.5	0.12%	573.5	2.00%	190	0.61%	503.5	1.09%
SQUID, LONG FINNED (LOLIGO)	20	0.01%	4.6	0.01%	2.5	0.01%	10.9	0.03%	2	0.00%	0	0.00%	0	0.00%	0	0.00%
MONKFISH, ROUND	12544.3	4.64%	2913	5.19%	1229.5	5.08%	1471	3.58%	1199.5	2.81%	1330.3	4.63%	1910.5	6.15%	2490.5	5.37%
OCEAN POUT	10.5	0.00%	0	0.00%	0	0.00%	0	0.00%	1	0.00%	9.5	0.03%	0	0.00%	0	0.00%
POLLOCK	22	0.01%	12.5	0.02%	0	0.00%	0	0.00%	9.5	0.02%	0	0.00%	0	0.00%	0	0.00%
PUFFER, NK	1	0.00%	0	0.00%	1	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
SCALLOP, SEA	47538.3	17.59%	14374	25.59%	5859	24.19%	3812.3	9.27%	7316	17.14%	6564	22.87%	7479	24.08%	2134	4.60%
SCULPIN, LONGHORN	1102.35	0.41%	449.55	0.80%	82.4	0.34%	239.9	0.58%	154.1	0.36%	24.2	0.08%	9.5	0.03%	142.7	0.31%
SEA RAVEN	949.7	0.35%	25.5	0.05%	36.7	0.15%	132	0.32%	225.5	0.53%	324	1.13%	164	0.53%	42	0.09%
SEA ROBIN	3.8	0.00%	0	0.00%	0.3	0.00%	3.5	0.01%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
SEA URCHIN	1.1	0.00%	0	0.00%	0.1	0.00%	0	0.00%	1	0.00%	0	0.00%	0	0.00%	0	0.00%
SHELL, NK	740	0.27%	0	0.00%	450	1.86%	0	0.00%	290	0.68%	0	0.00%	0	0.00%	0	0.00%
SQUID, SHORT FINNED (ILLEX)	31.6	0.01%	9	0.02%	4.95	0.02%	2.95	0.01%	1	0.00%	5.2	0.02%	1.3	0.00%	7.2	0.02%
SKATE, BARNDOOR	6615.5	2.45%	1115.7	1.99%	552.5	2.28%	945.7	2.30%	726.3	1.70%	1103.5	3.84%	687.3	2.21%	1484.5	3.20%
SKATE, LITTLE	37195.5	13.76%	9121	16.24%	2392	9.88%	7161	17.42%	2808	6.58%	2758.5	9.61%	4798	15.45%	8157	17.60%
SKATE, THORNY	0.5	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0.5	0.00%	0	0.00%
SKATE, WINTER	62452.5	23.11%	11733	20.89%	4977	20.55%	7751.5	18.86%	8108	18.99%	7283.5	25.37%	6709.5	21.60%	15890	34.29%
SNAIL, NK	5	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	5	0.02%	0	0.00%	0	0.00%
SPONGE	560	0.21%	0	0.00%	0	0.00%	25	0.06%	45	0.11%	263	0.92%	200	0.64%	27	0.06%
STARFISH (SEASTAR)	19278.5	7.13%	1131.5	2.01%	3735	15.42%	1434	3.49%	7781	18.23%	550	1.92%	368	1.18%	4279	9.23%
TORPEDO RAY	29	0.01%	18	0.03%	11	0.05%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%
TURTLE, LOGGERHEAD	85	0.03%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	85	0.27%	0	0.00%
SKATE, NK	4	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	0	0.00%	4	0.01%
GRAND TOTALS	**270,293.15**		**56,169.65**		**24,216.90**		**41,106.60**		**42,688.05**		**28,707.00**		**31,059.45**		**46,343.30**	

TABLE 1

	Sep-02			
	VESSEL 1		VESSEL 2	
SPECIES	**Lbs.**	**%**	**Lbs.**	**%**
BUTTERFISH	1.4	35.90%	2.5	64.10%
CLAM, SURF	0	0.00%	1	100.00%
CRAB, CANCER	0	0.00%	1.5	100.00%
CRAB, JONAH	1	50.00%	1	50.00%
CRAB, NK	1	33.33%	2	66.67%
CRAB, ROCK	0	0.00%	2	100.00%
DAB (AMERICAN PLAICE)	12.8	63.05%	7.5	36.95%
DOGFISH, SPINY	10.5	37.50%	17.5	62.50%
FLOUNDER, FOURSPOT (FOURSPOT)	24.3	71.89%	9.5	28.11%
FLOUNDER, SUMMER (FLUKE)	108.8	58.24%	78	41.76%
FLOUNDER, WINTER (BLACKBACK)	2114.5	61.12%	1345	38.88%
FLOUNDER, WITCH (GREY SOLE)	3.1	19.25%	13	80.75%
FLOUNDER, YELLOWTAIL (YELLOWTAIL)	4948	47.85%	5392.5	52.15%
HADDOCK	3.1	12.35%	22	87.65%
HAKE, RED (R. HAKE, LING)	4.5	100.00%	0	0.00%
HAKE, SILVER (WHITING)	10.7	36.96%	18.25	63.04%
HAKE, WHITE (W. HAKE)	0	0.00%	18.75	100.00%
LITTLE SKATE	3023	33.14%	6098	66.86%
LOBSTER	521	50.75%	505.5	49.25%
LONG FINNED SQUID (LOLIGO)	4.6	100.00%	0	0.00%
MONKFISH, ROUND	722	24.79%	2191	75.21%
POLLOCK	12.5	100.00%	0	0.00%
SCALLOP, SEA	7369	51.27%	7005	48.73%
SCULPIN, LONGHORN	127.3	28.32%	322.25	71.68%
SEA RAVEN	9	35.29%	16.5	64.71%
SHORT FINNED SQUID (ILLEX)	2.5	27.78%	6.5	72.22%
SKATE, BARNDOOR	564.7	50.61%	551	49.39%
STARFISH (SEASTAR)	1000	88.38%	131.5	11.62%
TORPEDO RAY (TORPEDO)	0	0.00%	18	100.00%
WINDOWPANE (SAND DAB, BRILL)	41.3	68.49%	19	31.51%
WINTER SKATE	5890	50.20%	5843	49.80%
GRAND TOTALS	**26,530.60**	47.23%	**29,639.25**	52.77%

TABLE 2

Oct-02

SPECIES	VESSEL 1 Lbs.	%	VESSEL 2 Lbs.	%
CRAB, JONAH	7.5	96.15%	0.3	3.85%
CRAB, NK	0.2	100.00%	0	0.00%
DAB (AMERICAN PLAICE)	3	100.00%	0	0.00%
FLOUNDER, FOURSPOT (FOURSPOT)	9.4	85.84%	1.55	14.16%
FLOUNDER, SUMMER (FLUKE)	28	72.73%	10.5	27.27%
FLOUNDER, WINTER (BLACKBACK)	170.5	51.51%	160.5	48.49%
FLOUNDER, WITCH (GREY SOLE)	6	100.00%	0	0.00%
FLOUNDER, YELLOWTAIL (YELLOWTAIL)	1835	59.63%	1242.25	40.37%
HAKE, RED (R. HAKE, LING)	1.2	100.00%	0	0.00%
HAKE, SILVER (WHITING)	2.1	67.74%	1	32.26%
HAKE, WHITE (W. HAKE)	1	100.00%	0	0.00%
LITTLE SKATE	1923	80.39%	469	19.61%
LOBSTER	698	50.11%	695	49.89%
LONG FINNED SQUID (LOLIGO)	2.2	88.00%	0.3	12.00%
MONKFISH, ROUND	1044.5	84.95%	185	15.05%
PUFFER, NK	1	100.00%	0	0.00%
SCALLOP, SEA	5036.5	85.96%	822.5	14.04%
SCULPIN, LONGHORN	72.5	87.99%	9.9	12.01%
SEA RAVEN	23.4	63.76%	13.3	36.24%
SEA ROBIN	0.3	100.00%	0	0.00%
SEA URCHIN	0.1	100.00%	0	0.00%
SHELL, NK	450	100.00%	0	0.00%
SHORT FINNED SQUID (ILLEX)	0.4	8.08%	4.55	91.92%
SKATE, BARNDOOR	352	63.71%	200.5	36.29%
STARFISH (SEASTAR)	3734.5	99.99%	0.5	0.01%
TORPEDO RAY (TORPEDO)	11	100.00%	0	0.00%
WINDOWPANE (SAND DAB, BRILL)	7.2	60.25%	4.75	39.75%
WINTER SKATE	3927	78.90%	1050	21.10%
GRAND TOTAL	**19347.5**	**79.89%**	**4871.4**	**20.11%**

TABLE 3

Nov-02

SPECIES	VESSEL 1 Lbs.	%	VESSEL 2 Lbs.	%
BUTTERFISH	1.35	87.10%	0.2	12.90%
COD, ATLANTIC	29.5	74.68%	10	25.32%
CRAB, JONAH	1.3	11.82%	9.7	88.18%
CRAB, NK	0.3	100.00%	0	0.00%
CUNNER	4	100.00%	0	0.00%
DOGFISH, SMOOTH	6	100.00%	0	0.00%
DOGFISH, SPINY	16	30.48%	36.5	69.52%
FLOUNDER, AMERICAN PLAICE (DAB)	1.5	6.76%	20.7	93.24%
FLOUNDER, FOURSPOT	32	42.11%	44	57.89%
FLOUNDER, SUMMER (FLUKE)	52.5	24.88%	158.5	75.12%
FLOUNDER, WINDOWPANE (SAND DAB)	215.1	44.10%	272.7	55.90%
FLOUNDER, WINTER (BLACKBACK)	1535.5	66.41%	776.5	33.59%
FLOUNDER, WITCH (GREY SOLE)	5	18.87%	21.5	81.13%
FLOUNDER, YELLOWTAIL	6127.5	43.03%	8111.2	56.97%
HADDOCK	230.5	97.05%	7	2.95%
HAKE, RED (LING)	0	0.00%	12.5	100.00%
HAKE, SILVER (WHITING)	0.6	26.09%	1.7	73.91%
LOBSTER	121.5	32.36%	254	67.64%
MONKFISH, ROUND	466	31.68%	1005	68.32%
SCALLOP, SEA	973.3	25.53%	2839	74.47%
SCULPIN, LONGHORN	22.1	9.21%	217.8	90.79%
SEA RAVEN	36	27.27%	96	72.73%
SEA ROBIN	0	0.00%	3.5	100.00%
SKATE, BARNDOOR	387.5	40.97%	558.2	59.03%
SKATE, LITTLE	2080	29.05%	5081	70.95%
SKATE, WINTER	2923	37.71%	4828.5	62.29%
SPONGE	0	0.00%	25	100.00%
SQUID, LONG FINNED (LOLIGO)	7.6	69.72%	3.3	30.28%
SQUID, SHORT FINNED (ILLEX)	2.75	93.22%	0.2	6.78%
STARFISH (SEASTAR)	34	2.37%	1400	97.63%
GRAND TOTAL	**15,312.40**	**37.25%**	**25,794.20**	**62.75%**

TABLE 4

Dec-02

SPECIES	VESSEL 1 Lbs.	%	VESSEL 2 Lbs.	%
BUTTERFISH	0	0.00%	0.25	100.00%
COD, ATLANTIC	40	26.49%	111	73.51%
CRAB, CANCER, NK	1	100.00%	0	0.00%
CRAB, JONAH	0	0.00%	2.8	100.00%
DOGFISH, SPINY	13	61.90%	8	38.10%
FLOUNDER, AMERICAN PLAICE (DAB)	11	53.66%	9.5	46.34%
FLOUNDER, FOURSPOT	10.4	19.70%	42.4	80.30%
FLOUNDER, SUMMER (FLUKE)	99.5	46.82%	113	53.18%
FLOUNDER, WINDOWPANE (SAND DAB)	54.5	24.14%	171.3	75.86%
FLOUNDER, WINTER (BLACKBACK)	1503	61.85%	927	38.15%
FLOUNDER, WITCH (GREY SOLE)	1	8.33%	11	91.67%
FLOUNDER, YELLOWTAIL	3672	36.76%	6316	63.24%
HADDOCK	475	59.38%	325	40.63%
HAKE, RED (LING)	0	0.00%	21	100.00%
HAKE, WHITE	24	82.76%	5	17.24%
LOBSTER, AMERICAN	36	68.57%	16.5	31.43%
MONKFISH, ROUND	416	34.68%	783.5	65.32%
OCEAN POUT	0	0.00%	1	100.00%
POLLOCK	0	0.00%	9.5	100.00%
SCALLOP, SEA	1784	24.38%	5532	75.62%
SCULPIN, LONGHORN	21.2	13.76%	132.9	86.24%
SEA RAVEN	95	42.13%	130.5	57.87%
SEA URCHIN	0	0.00%	1	100.00%
SHELL, NK	0	0.00%	290	100.00%
SKATE, BARNDOOR	317.5	43.71%	408.8	56.29%
SKATE, LITTLE	914	32.55%	1894	67.45%
SKATE, WINTER	3489	43.03%	4619	56.97%
SPONGE	0	0.00%	45	100.00%
SQUID, LONG FINNED (LOLIGO)	0	0.00%	2	100.00%
SQUID, SHORT FINNED (ILLEX)	1	100.00%	0	0.00%
STARFISH (SEASTAR)	406	5.22%	7375	94.78%
GRAND TOTAL	**13384.1**	**31.35%**	**29303.95**	**68.65%**

TABLE 5

Jul-03

	VESSEL 1		VESSEL 2	
SPECIES	**Lbs.**	**%**	**Lbs.**	**%**
COD, ATLANTIC	19.5	100%	0	0%
CRAB, JONAH	0	0%	75	100%
CRAB, NK	4	100%	0	0%
FLOUNDER, AMERICAN PLAICE	84.3	77%	25	23%
FLOUNDER, FOURSPOT	7.9	65%	4.3	35%
FLOUNDER, SUMMER (FLUKE)	9.5	100%	0	0%
FLOUNDER, WINDOWPANE	3	31%	6.7	69%
FLOUNDER, WINTER	1639	82%	352	18%
FLOUNDER, WITCH (GREY	101.5	77%	29.5	23%
FLOUNDER, YELLOWTAIL	3077.5	60%	2058.5	40%
HADDOCK	278	69%	125.8	31%
HAKE, RED (LING)	0.3	50%	0.3	50%
HAKE, SILVER (WHITING)	0	0%	11.2	100%
LOBSTER, AMERICAN	377	66%	196.5	34%
MONKFISH, ROUND	796.3	60%	534	40%
OCEAN POUT	3	32%	6.5	68%
SCALLOP, SEA	2129	32%	4435	68%
SCULPIN, LONGHORN	4	17%	20.2	83%
SEA RAVEN	216	67%	108	33%
SKATE, BARNDOOR	684	62%	419.5	38%
SKATE, LITTLE	1827	66%	931.5	34%
SKATE, WINTER	5002	69%	2281.5	31%
SNAIL NK	5	100%	0	0%
SPONGE	133	51%	130	49%
SQUID, SHORT FINNED (ILLEX)	0.2	4%	5	96%
STARFISH (SEASTAR)	520	95%	30	5%
GRAND TOTAL	**16921**	**59%**	**11786**	**41%**

TABLE 6

Aug-03

SPECIES	VESSEL 1 Lbs.	%	VESSEL 2 Lbs.	%
COD, ATLANTIC	0	0%	4.5	100%
FLOUNDER, AMERICAN	35.7	37%	61	63%
FLOUNDER, FOURSPOT	8.1	38%	13	62%
FLOUNDER, SUMMER (FLUKE)	33.5	41%	48	59%
FLOUNDER, WINDOWPANE	17	12%	128	88%
FLOUNDER, WINTER	537.5	40%	810	60%
FLOUNDER, WITCH (GREY	43	27%	119	73%
FLOUNDER, YELLOWTAIL	2528	42%	3454	58%
HADDOCK	54	10%	489	90%
HAKE, RED (LING)	1	80%	0.25	20%
HAKE, WHITE	0.3	9%	3	91%
LOBSTER, AMERICAN	112	59%	78	41%
MONKFISH, ROUND	596.5	31%	1314	69%
SCALLOP, SEA	240	3%	7239	97%
SCULPIN, LONGHORN	9.5	12%	69	88%
SEA RAVEN	69	42%	95	58%
SKATE, BARNDOOR	326.8	48%	360.5	52%
SKATE, LITTLE	1823	38%	2975	62%
SKATE, THORNY	0	0%	0.5	100%
SKATE, WINTER	3058.5	46%	3651	54%
SPONGE	0	0%	200	100%
SQUID, SHORT FINNED (ILLEX)	1.3	100%	0	0%
STARFISH (SEASTAR)	40	11%	328	89%
TURTLE, LOGGERHEAD	0	0%	85	100%
GRAND TOTAL	**9534.7**	**31**	**21524.75**	**69**

TABLE 7

Sep-03

SPECIES	VESSEL 1 Lbs.	%	VESSEL 2 Lbs.	%
COD, ATLANTIC	0	0%	18	100%
FLOUNDER,	4.5	94%	0.3	6%
FLOUNDER,	3	44%	3.8	56%
FLOUNDER, SUMMER	15	100%	0	0%
FLOUNDER, WINTER	105	49%	110	51%
FLOUNDER, WITCH	4	50%	4	50%
FLOUNDER,	5030.7	56%	3981.9	44%
HADDOCK	7.2	100%	0	0%
HAKE, SILVER	0.2	100%	0	0%
LOBSTER, AMERICAN	13	18%	60	82%
MONKFISH, ROUND	329	51%	320	49%
SCALLOP, SEA	43	24%	134	76%
SCULPIN, LONGHORN	16	44%	20.5	56%
SEA RAVEN Total	5	45%	6	55%
SKATE, BARNDOOR	108	29%	262.5	71%
SKATE, LITTLE	648	50%	641	50%
SKATE, NK	4	100%	0	0%
SKATE, WINTER	2007	54%	1704	46%
SPONGE	0	0%	7	100%
SQUID, SHORT	1	56%	0.8	44%
STARFISH (SEASTAR)	20	87%	3	13%
Grand Total	**3332.9**	**50%**	**3294.9**	**50%**

TABLE 8

Discussion

The main question posed by this study was can yellowtail flounder be targeted seasonally in Closed Area II without bycatch of cod and haddock? The answer to this question is very clear. Yellowtail flounder can be targeted without significant bycatch of cod or haddock. Yellowtail flounder catches were high throughout the access area, but tended to be highest in the northern and central grid blocks. Catches as high as 1400 lbs. for a 20 minute tow were recorded with a mean weight per tow overall of 118 lbs. Bycatch rates inside grid blocks with the highest yellowtail flounder yield tended to be lower for most key species except winter flounder and haddock whose catches were fairly consistent irrespective of yellowtail catch. Overall catch rates were fairly consistent from month to month for all species although obvious large movements ie changes in areas of peak density were evident. This was particularly evident for yellowtail flounder which showed evidence of large scale movements south and west during the months of September through December before appearing to split into two components (Figure 22). One component appeared to move out of the Closed Area to the west (Figure 22, December data) while the other component appeared to move to the south east corner of the closed area. This tends to agree with observations on fishing activity with higher catches being reported along the north west and south east edges of the closure (Murawski, pers. Comm.). Cod was almost completely absent from the study area, with zero catch rates during some months. Haddock showed seasonal patchiness with little apparent evidence of directed movements (Figure 24) while other species appeared to show peak densities in one particular portion of the closed area e.g. monkfish (Figure 25) which was found in greatest densities in deeper water along the south eastern corner.

Overall however, catches were mixed with most species being represented in every haul. In total yellowtail flounder, despite the localized large catches accounted for only 21% by weight of all fish caught (Figure 6, Table 1) while haddock accounted for less than 1% (0.75%) and cod less than 1/10th of 1% (0.09%). Surprisingly however, other species were almost as abundant as yellowtail. Winter skate accounted for 23% of total catch while scallops and little skate comprised 18% and 14% respectively. It should be noted however that scallops were all returned to the sea subsequent to weighing, accordingly weights are for whole not shucked scallops. The weight reported for scallops (18%) is therefore artificially inflated nonetheless it reflects a realistic impact on scallop resource. The observations regarding skate species are very interesting. Skates proved to be very abundant and barndoor skate were captured in almost every tow. Barndoor skate were previously reported in popular press to be on the verge of extinction within the Gulf of Maine Georges Bank ecosystems, but the data presented here indicates barndoor skate are widely distributed at least within the lower portion of Closed Area II.

The study area of approximately 1400 square miles traditionally supported a yellowtail fishery and it currently supports a robust yellowtail resource. As reported above, catch rates were variable from grid block to grid block and between months but dramatic catches were observed in localized areas (up to 1400 lbs. per 20 minute tow, equivalent to 4200 lbs./hr). In addition, because of the use of 6 ½" square mesh codends used throughout this study, almost all yellowtail were comfortably above the minimum landing size (Figure 7). The significance of this observation is that not only is there minimal bycatch of cod and haddock but there is little or no discard of undersized yellowtail.

Clearly the closure as a management tool has resulted in a dramatic rebuilding of the economically important yellowtail resource and it would appear on the basis of the results presented here that it would be possible to access the rebuilt yellowtail resource during the months of July through December without a significant bycatch of cod and haddock. However, there are a number of caveats attached.

1) Although one month (September) was sampled in two years (2002 and 2003) and the data show strong similarities, there is little information regarding how representative the data from the present study would be for subsequent years. Data presented here is simply a snapshot of relative density distributions and this may or may not reflect longer term stability of fish distributions. That being said, data for September is sufficiently similar in both years sampled to suggest that the data may have some longer term relevance. However, it is not clear how this might be affected by re-introduction of commercial fishing pressure.
2) One surprising result was that in what was designed to be a directed yellowtail fishery, yellowtail accounted for only 20% by weight of total catch. Other commercially important species such as other flounders and monkfish accounted for almost 10% of total catch while the skates combined (little, winter and barndoor) accounted for almost 40% in total (see Table 1, Figure 6). These data indicate potential for significant bycatch of other species including scallops and at least two species of skate (little and winter) however some of these concerns could easily be addressed by simple gear modifications and therefore rendered non-issues.
3) The study presented here was intended to gather information on fish densities and distributions and to investigate the potential or otherwise for bycatch and discard in a directed yellowtail fishery. An enormous amount of data were collected during the course of the study and these data are likely to prove important in many ways not least in terms of understanding aspects of the ecology of the Georges Bank ecosystem. But, this study was not designed as a strict survey and was not designed to follow strict survey protocols. Consequently, while the data undoubtedly have implications with respect to stock structure, the data should not be considered survey data.

It is our recommendation that management decisions with regard to the study area within Closed Area II take these observations into account.

One other significant aspect of the project reported here was the degree of collaboration and cooperation between a large number of entities and individuals. The study was extremely complex and required high levels of coordination and attention to detail. Lessons were learned from dialogue with individuals involved in the previous experimental fishery for scallops and a set of robust and detailed protocols were developed with considerable input from NOAA/NMFS Northeast Regional Office, The Northeast Fisheries Science Center, The Cooperative Research Partners Initiative, The US Coastguard and many industry sources. It should also be noted here that monies from sale of the catch was fed back into the experimental program and this helped expand the project beyond its original scope and helps illustrate how properly conducted experimental fishing can help pay for additional research. We believe that the template reported here for planning and implementation of industry and science collaborative research programs shows how much can be achieved by all parties working together and perhaps even more importantly shows how work such as this can have an immediate impact on management of important commercial resources.

The project clearly and definitively answered the primary question posed, "Can yellowtail be targeted in Closed Area II, seasonally, without bycatch of cod and haddock?". However, as outlined above the amount of detailed information collected during the study has much wider implications than merely demonstrating that yellowtail can be targeted without a significant bycatch of cod or haddock. The data continue to be explored and it is our intention to incorporate other existing databases already in existence (e.g. scallop experimental fishery data, NOAA/NMFS Fishery Observer Program data, Resource Survey data) in an attempt to maximize output from the study and to gain a greater understanding of and insight into the ecology of the complex ecosystem on Georges Bank.

In summary, this project involved a large number of individuals and organizations and required intricate and detailed planning and implementation. It generated vast amounts of detailed fine scale data on fish densities, distributions and ecological interrelationships. It is hoped that the database will be of significance well beyond the scope of the project reported here and that it can be integrated with other existing data sets to gain further insight into the ecology of the Georges Bank ecosystem.

We believe that this industry and science collaborative research program provides a template for planning and implementing effective studies and shows how much can be achieved by all parties working together towards a common goal. But perhaps even more importantly this study shows how work such as this can have an immediate impact on management of important commercial resources.

The data clearly demonstrated that yellowtail flounder can be targeted in the southern portion of Closed Area II without bycatch of or impact on cod or haddock stocks. They also showed high catch rates for above minimum landing size yellowtail flounder (up to 4200 lbs. per hour) but surprisingly that yellowtail flounder comprised only 21% of the total catch. Skates comprised over 40% of total catch while cod and haddock accounted for 0.09% and 0.75% respectively. The data did indicate potential for significant bycatch of other species including scallops and monkfish.

Summary

Experimental fishing was conducted during the months of July through December in the lower portion of Closed Area II on Georges Bank. The experimental fishery used two vessels for one five-day trip per month, fishing simultaneously inside a grid pattern. The vessels fished paired tows, (that is, both vessels inside the same grid block fishing alongside each other) every fifth grid block with one vessel fishing alone in each block in between. Vessels fished with standard flatfish nets with 6 ½" square mesh codends. Vessels began fishing at the southwest corner of Closed Area II and proceeded across and upwards in a leap-froging fashion until all grid blocks were sampled. In all tows, catch was separated by species, each species weighed and all commercially important species subjected to length frequency measurement. All scallops lobsters and undersized fish were returned to the sea immediately after sampling. Proceeds from sale of the catch was fed back into the program and helped augment the data set by funding additional sampling trips.

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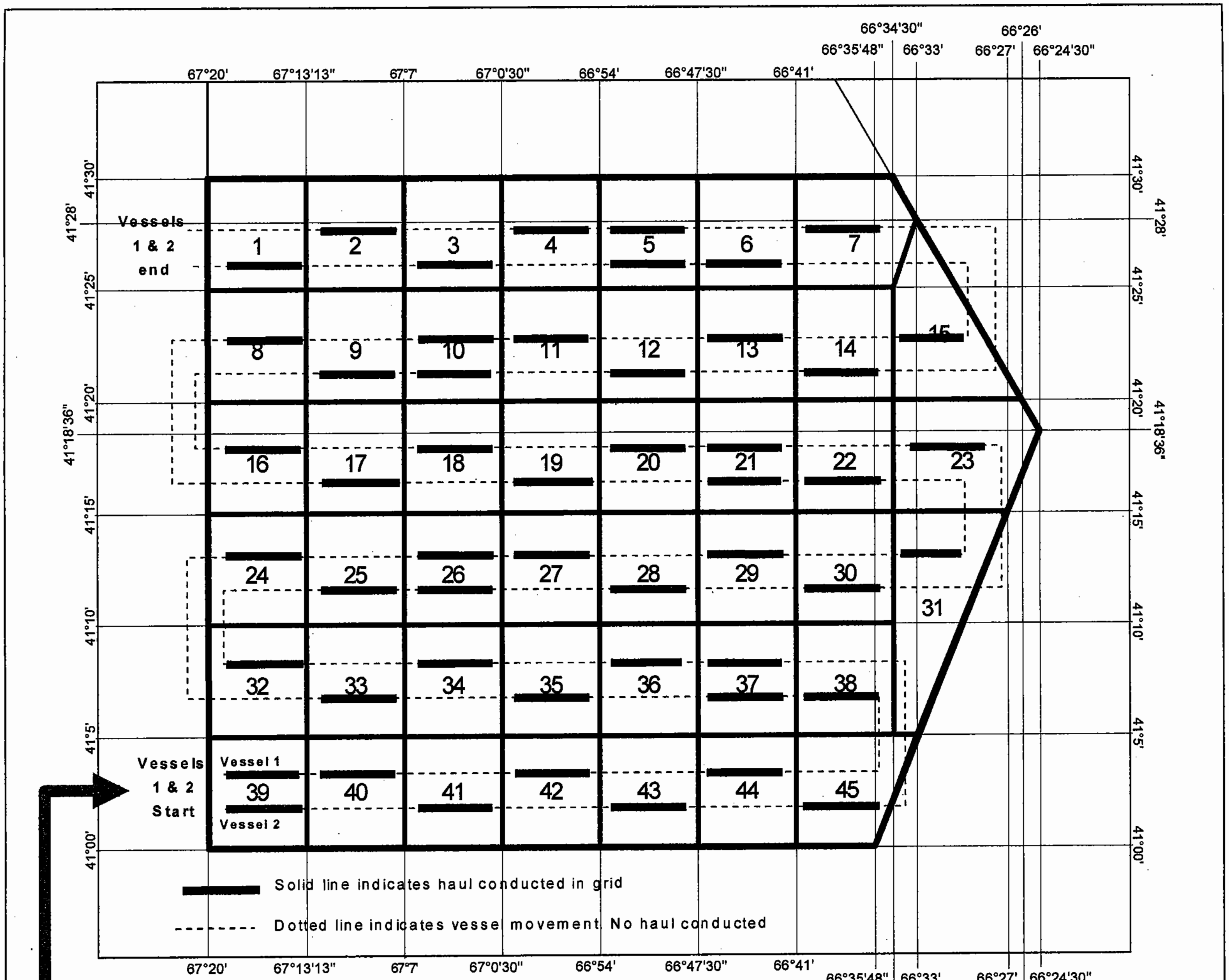
Vessel List

- F/V Capt'n Mark, Portland, ME
- F/V Capt' Jake, Portland, ME
- F/V Theresa & Allyson, Portland, ME
- F/V Mary K, New Bedford, MA
- F/V Isabel S, New Bedford, MA
- F/V Endurance, Boothbay, ME
- F/V Theresa Marie III, Portland, ME
- F/V Theresa Marie IV, Portland, ME
- F/V Lydia & Maya, Portland, ME
- F/V Olympia, Portland, ME
- F/V Drake, Portland, ME
- F/V E.L. Moore, Portland, ME
- F/V Gen. Patton, Portland, ME
- F/V Captain Sam II, Boston, MA
- F/V Tripolina, Boston, MA

Appendix 2



BOTH VESSELS START HERE. ALL SIDE-BY-SIDE HAULS IN SAME GRID MUST START AT THE SAME TIME (GRIDS: 39, 37, 26, 21, 10 & 5).

Yellowtail Closed Area II Project Protocols

Vessel #1 and Vessel #2 are to be determined before trip

5-day total trip maximum (2 days steaming; 3 days sampling-do not exceed 5 days)

Call Coastguard (617-223-8135 or 8584) before leaving dock to notify them of our intentions. Once on site, before hauls begin, notify lobster vessels that you are in the area and will be hauling the following days. Maintain open communication with lobster vessels, Coastguard and other vessel for trip duration

20 minute hauls (brakes locked to brake release) in all grids (see chart)

Vessels shall complete only hauls specified and in order as shown on chart and complete as many hauls as possible per day. Hauls must be valid (i.e. no serious hang-up or blown out net), repeat haul if serious incident occurs (observers' discretion). After 3 fishing days are complete, all (if any) remaining hauls will not be completed

Haul #/day target: Day 1 - 9 hauls
Day 2 - 9 hauls
Day 3 - all remaining hauls possible

Side-by-side hauls: Vessels will haul as close to each other as possible (within a safe distance of course) at captain's discretion. Both vessels must conduct hauls at the same time in the assigned grids

Trip limits per vessel: 2000lbs/day Cod
3000lbs/day (5000lbs/day after Oct. 1s1 Haddock
40,OOOlbs/trip Yellowtail Flounder

Crew will help sort the catch, observers to concentrate on measuring and transcribing data (at the end of each haul transcribe all data to sheets before the next haul)

Actual weights must be taken on all species

Length frequency measurements (sub-samples, if needed, to be taken from fish that have been sorted by legal/sub-legal sizes:

All commercial flat fishes (Yellowtail, Dabs, Winter Flounder, Fluke, Halibut & Grey Sole)
Cod
Haddock
Barn Door Skate
Monkfish (time permitting)

Please remember to take pictures and video if possible